

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-100592

(43)Date of publication of application : 05.04.2002

(51)Int.Cl.

H01L 21/304  
B24B 37/00

(21)Application number : 2000-286213

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(22)Date of filing : 20.09.2000

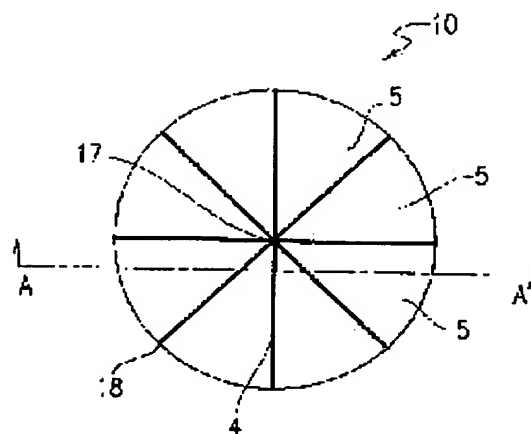
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## (54) ABRASIVE PAD

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an abrasive pad, with which the grade of polishing can be variously changed as designed by forming a stable groove shape without making a wafer fall from a holder by friction during wafer polishing and exchange work can be easily executed.

**SOLUTION:** An abrasive pad 10 is provided which is equipped with an upper layer 2 and a lower layer 1 and forms at least one recessed part 21 by locating the upper layer 2.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

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CLAIMS

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[Claim(s)]

[Claim 1] The scouring pad with which one or more crevices are formed by having the upper layer and a lower layer and arranging this upper layer on this lower layer.

[Claim 2] The scouring pad according to claim 1 with which said upper layer is formed from the piece of a pad of two or more sheets, and this piece of a pad is stuck on said lower layer.

[Claim 3] The scouring pad according to claim 1 or 2 which is said crevice fang furrow.

[Claim 4] A scouring pad given in the term of either of claims 1-3 by which the depth of said crevice is adjusted by [ said ] changing the upper thickness at least.

[Claim 5] A scouring pad given in the term of either of claims 1-4 by which said upper layer is stuck on said lower layer possible [ exfoliation ] with the double-sided tape.

[Claim 6] It is polish equipment which it had the upper part and a lower surface plate, and the ground body was held at this up surface plate, and the scouring pad with which this lower surface plate top has the upper layer and a lower layer, and one or more crevices are formed of arrangement of this upper layer was prepared, and is equipped with the nozzle which can supply a polish slurry between this scouring pad and the front face of this ground object.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to polish processing of a semi-conductor wafer etc.

[0002]

[Description of the Prior Art] In recent years, in silicon society, the degree of integration of IC increases by leaps and bounds, and is advancing to 64M to 4M, 16M, and a pan.

[0003] Under such a situation, the improvement in the grace of the front face of the wafer which is the base of IC, and the demand to cost have been developing increasingly. a wafer is chemical -- description -- electric -- although description is also a natural thing, in order to raise the degree of integration of IC, the minimum line width which constitutes the device formed on a wafer becomes still smaller, and a demand is developed from 0.5 microns to 0.35 microns. Furthermore enlargement of a wafer progresses quickly and the cost per bit is also falling quickly in connection with this. Recently, the 12 inches silicon wafer has appeared on the market, and since it corresponds to enlargement of a wafer, a scouring pad various type exists.

[0004] For example, the following troubles became clear when it was going to grind 12 inches and a 16 inch wafer using a nonwoven fabric pad.

(1) When there is no slot in a front face, a slurry does not reach to the center section of a semi-conductor wafer, therefore big frictional force occurs between a scouring pad and a wafer, a wafer starts from an electrode holder during wafer polish, and a wafer may grind. In that case, the availability of equipment is reduced and the yield of a product is made to fall.

(2) If a slot is excavated with a diamond cutter when it is going to perform recessing to a nonwoven fabric pad in order to supply a slurry to the center section of a wafer and to cancel the above-mentioned fault, fiber comes loose, the fuzz of a slot occurs and the shape of a quirk by which it was stabilized as the design cannot be acquired. Moreover, if it is going to form a slot with heating, recessing by heat deformation of a front face will become very difficult on the property of a nonwoven fabric. Therefore, it is very difficult to design the grade of semi-conductor polish by recessing of the pad of a nonwoven fabric.

(3) Since the diameter of the lower surface plate of polish equipment is set to 1800mm or more when grinding the wafer of the diameter of macrostomia, the activity which exchanges the scouring pad which has an equivalent diameter becomes difficult in one person, and maintenance time amount also becomes long. Consequently, the fall of the yield of a product is caused and the availability of equipment also falls.

(4) In order to change the object film, a processing process, etc. (polish condition), when changing the configuration and the depth of a slot, it is necessary to remove the whole body of a pad from a turn table, and to change into a scouring pad another type. It being necessary to change the object film and a processing process frequently, preparing many kinds of pads, and carrying out exchange of a large-sized scouring pad has very bad effectiveness from the difficulty of the activity in an experiment or a development stage.

[0005]

[Problem(s) to be Solved by the Invention] In order that this invention may solve the above-mentioned problem, a wafer is not omitted from a holder during wafer polish with friction, and it can change the grade of polish as a design variously by formation of the shape of a stable quirk, and aims at offering the scouring pad which can carry out exchange easily.

[0006]

[Means for Solving the Problem] By equipping the scouring pad of this invention with the upper layer and a lower layer, and arranging this upper layer on this lower layer, one or more crevices are formed and the above-mentioned purpose is attained by that.

[0007] In the one embodiment, said upper layer is formed from the piece of a pad of two or more sheets, and this piece of a pad is stuck on said lower layer.

[0008] In the one embodiment, it is said crevice fang furrow.

[0009] In the one embodiment, the depth of said crevice is adjusted by [ said ] changing the upper thickness at least.

[0010] In the one embodiment, said upper layer is stuck on said lower layer possible [ exfoliation in said lower layer ] with the double-sided tape.

[0011] The ground body was held at this up surface plate, this lower surface plate was equipped with the scouring pad with which it has the upper layer and a lower layer, and one or more crevices are formed of arrangement of this upper layer, and is equipped [ the polish equipment of this invention is equipped with the upper part and a lower surface plate, ] with the nozzle which can supply a polish slurry between this scouring pad and the front face of the ground body, and the above-mentioned technical problem is attained by that.

[0012] This invention is explained to a detail below.

[0013]

[Embodiment of the Invention] The scouring pad 10 of this invention has the piece 5 of a pad possible [ exfoliation ] by the adhesive layer of double-sided tape 7 grade on the lower layer 1 and lower layer 1 of a circle configuration, as shown in drawing 1 and drawing 4 . The upper layer 2 consists of pieces 5 of a pad of two or more sheets, and one or more slots 4 are formed between the piece 5 of a pad which adjoins by arrangement of the pieces 5 and 5 of a pad, and 5. When the upper layer 2 is seen from a top face, as shown in drawing 1 , a radial is sufficient as the configuration of a slot 4, and it may have the shape of a grid as are shown in drawing 5 and shown in annular or drawing 8 . Or as shown in drawing 9 , the piece 5 of a pad is circular, a crevice 21 may be formed between the pieces 5 of a pad which adjoin by that cause, it has holes, such as a round shape, in the upper layer 2, and the crevice 21 may be formed in it. The depth of a slot 4 or a crevice 21 has the depth according to the thickness of the upper layer 2. The width of face of the desirable slot 4 is 0.2-5mm, and the depth of the desirable slot 4 is 0.3-1.2mm.

[0014] If the crevice is formed of the combination of the upper layer 2 and the lower layer 1 which were fabricated, it will be understood as the thing included in the range of this invention also in a configuration like a throat except \*\*\*\*.

[0015] Next, the process of the above-mentioned scouring pad 10 shown in drawing 1 is explained. It prepares as the lower layer 1 fabricated to disc-like, a lower layer 1, and the upper layer 2 of isomorphism, and the upper layer 2 is cut to a radial, as shown in drawing 3 . Preferably, the width of face of the slitting 3 at that time is deeply cut with the dimension which is in agreement with the width of face of the slot 4 which it is going to form. And the piece 5 of a pad which was cut deeply and formed in the shape of a sector is stuck using the general-purpose double-sided tape 7 on a lower layer 1. The periphery section 6 of the sector-like piece 5 of a pad is made in agreement with the periphery section 22 of a lower layer 1, and it is made to arrange by carrying out spacing with the adjoining piece 5 of a pad at equal intervals preferably, respectively in that case. At this time, it is good to give the positioning line 19 beforehand to a lower layer 1 so that a location may not shift. Consequently, the radial slot 4 which has the width of face of slitting 3 and width of face in agreement can be created on a scouring pad 10. Although the case where eight pieces of pieces 5 of a pad are shown in drawing 1 is shown, with [ the number of slots 4 ] one [ or more ], the numbers of pieces of arbitration (for example, 6, 10, 12, etc. pieces, etc.) can be adopted.

[0016] If the process of the scouring pad 10 shown in drawing 5 is explained, the upper layer 2 will be clipped to the annular piece 5 of a pad of two or more of these alignments, and the piece 5 of a pad will be stuck on a lower layer 1. Consequently, the annular slot 4 which has the width of face of slitting and the width of face of the same dimension can be created on a scouring pad 10. Although drawing 5 illustrates the example which has four annular slots 4, as long as there are one or more slots 4, the upper layer 2 may consist of pieces 5 of a pad of the number of arbitration.

[0017] The scouring pad 10 shown in drawing 8 is created by fabricating the grid-like slot 4 by cutting the upper layer 2 in the shape of a rectangle, and sticking the piece 5 of a pad on a lower layer 1.

[0018] As shown in drawing 9 , the scouring pad 10 which is not constant width and which has a crevice 21 can also be created by fabricating the upper layer 2 in the shape of [ two or more ] a circle, considering as the piece 5 of a pad, sticking the piece 5 of a pad on a lower layer 1, and preparing the circle-like protrusion section.

[0019] Or by sticking one or more suitable holes on the upper layer 2 at \*\*\*\* omission and a lower layer 1, a circle-like crevice can be formed and a scouring pad 10 can also be created. A hole may not be circular

and may be the configuration of arbitration here.

[0020] Although the thickness of the upper layer 2 and the thickness of a lower layer 1 are totaled and it is about 2mm, the depth of the slot 4 formed can be changed by changing the combination of the thickness of the upper layer 2, and the thickness of a lower layer 1. Drawing 6 can show the cross section of a scouring pad 10 in  $>$  (thickness of the upper layer 2) (thickness of a lower layer 1), and can form a trench in this case. drawing 7 --  $<$  (thickness of the upper layer 2) (thickness of a lower layer 1) -- the cross section of the scouring pad 10 of a case can be shown, and a slot shallow in this case can be formed.

[0021] Thus, since the shape of a quirk stabilized since fiber came loose to the scouring pad of one sheet like [ in the case of carrying out digging formation of the slot with a diamond cutter etc. ] in order to form a slot 4 by cutting and separating the upper layer 2 and processing attachment etc., and \*\*\*\*\* did not occur is acquired, the shape of a various quirk can be acquired easily.

[0022] It consists of a thing (for example, foam) which consists of a constituent of the polymer chosen from polyurethane resin, an epoxy resin, or vinyl resin as a base used for the upper layer 2 of the scouring pad of this invention, and a lower layer 1, or complex which consists of this constituent and a base material, and the following are mentioned as foam.

[0023] A foam constituent can be formed by the wet coagulation method by using the constituent containing an urethane polymer and dimethylformamide as the above-mentioned foam, for example. Or a foam constituent can be formed by the wet coagulation method by using the constituent containing an urethane polymer, vinyl polymerization objects, such as a vinyl chloride polymer, a vinyl chloride vinyl acetate copolymer, and a vinyl chloride-vinyl acetate-vinyl alcohol ternary polymerization object, and dimethylformamide. The surface section of this foam and the skin formed especially in that front face are good to carry out a buff and to make it the structure where foaming structure appears in a front face. These foam can be used for the upper layer and lower layer both.

[0024] As the above-mentioned urethane polymer which means thermosetting, both polyether system urethane resin polyester system urethane resin polyester ether system urethane resin and polycarbonate system urethane resin can be used. As a polyol component used for manufacture of each urethane resin, polyoxy ethylene glycol, a polyoxypropylene glycol, polyoxy tetramethylene glycol, a polyethylene horse mackerel peat, a polypropylene horse mackerel pay training, a polyoxy tetramethylen horse mackerel peat, etc. are mentioned, for example. Moreover, as an isocyanate component, 4 and 4'-diphenylmethane diisocyanate, 2, and 4-tolylene diisocyanate etc. is mentioned, for example.

[0025] As a chain elongation agent, ethylene glycol, 1, 4-butanediol, propylene glycol and 3, 3'-dichloro -4, 4'-diamino diphenylmethane, etc. are mentioned, for example.

[0026] As for the above-mentioned urethane polymer, the dimethylformamide solution of the urethane polymer which used ethanol as 1, 4-butanediol, and a terminator, used dimethylformamide as a solvent as 4 and 4'-diphenylmethane diisocyanate and a chain elongation agent as a polyoxypropylene glycol and an isocyanate component as a polyol component, and carried out the polymerization is used, for example.

[0027] Distributed stabilizers, such as bulking agents, such as carbon black, and a surfactant, and a wet coagulation assistant may be added by the above-mentioned foam constituent.

[0028] Foam can be obtained by the wet coagulation method which a front face applies the above-mentioned foam constituent on the base material of a mold-release characteristic, for example, is shown below.

[0029] That is, after being immersed in underwater [ of predetermined temperature ], fixed time amount immersion of the base material with which the foam constituent was applied is carried out all over the molten bath of predetermined temperature. By permuting the solvent contained in a foam constituent by osmosis of water during this immersion, desolventization of the foam constituent is carried out, it low-foams to a foam constituent, and an elastic \*\*\*\* foam layer is formed on a base material. Next, from the water, whenever [ place constant temperature ], and predetermined time hot air drying of this thing are taken out and carried out, it carries out a buff, and foam is obtained.

[0030] The above-mentioned foam constituent can be sunk into a base material, and complex can be formed by the wet coagulation method like the above. As a base material, a nonwoven fabric (Japanese felt BS-300) etc. can also be used, for example.

[0031] An operation of the scouring pad 10 of this invention which has the above configuration is explained below based on drawing 10 .

[0032] The scouring pad 10 of this invention is installed on the lower surface plate 8 of semi-conductor polish equipment 20, and the holder 13 of the up surface plate 9 is equipped with a wafer 14. The up surface plate 9 can add a load and is pressed by the lower surface plate 8. By the up surface plate 9 and the lower surface plate 8 countering, as shown in drawing 10 , and rotating to hard flow, a wafer 14 is ground with a

scouring pad 10. A slurry 11 is distributed by homogeneity on a scouring pad 10 by introducing a slurry 11 through a nozzle 12 between a scouring pad 10 and a wafer 14, and using the scouring pad 10 of this invention in that case. The principle is as the following explanation.

[0033] The slurry 11 supplied between them is distributed by homogeneity on a scouring pad 10 as a scouring pad 10 and a wafer 14 rotate. At this time, the excessive slurry 11 is accumulated into the slot 4 of a scouring pad 10, and the slurry 11 beyond the need is removed from on a scouring pad 10. On the other hand, since each is rotating the lower surface plate 8 and the up surface plate 9 to hard flow by arrangement of drawing 10, the field 15 near the periphery of a scouring pad 10 differs in the relative velocity of a wafer 14 and a scouring pad 10 from the field 16 near a core, and if there is no slot in a scouring pad 10, in the field of the periphery 10 neighborhood where the relative velocity of a wafer 14 and a scouring pad 10 is quick, a slurry 11 will decrease from between a wafer 14 and scouring pads 10 quickly by friction. And distribution of a slurry 11 becomes uneven with time amount, and the polish condition of a wafer 14 also serves as an ununiformity. If the scouring pad 10 of this invention is used and the field slurries 11 run short on a wafer 14 will be made, the slurry 11 accumulated into the slot 4 is supplied, and since an insufficiency is canceled, uniform polish of a wafer 14 is realizable.

[0034] In the scouring pad 10 shown in drawing 1 by which the slot 4 was formed in the radial, with rotation of a scouring pad 10, as for the slurry 11 accumulated into the slot 4, the surplus slurry 11 accumulated in Mizouchi passes through between a scouring pad 10 and wafers 14 early comparatively according to the centrifugal force in order to move to a periphery 18 from the core 17 of a scouring pad 10. On the other hand, in the scouring pad 10 shown in drawing 5 by which the slot was formed in concentric circular, since it is hard coming to move the surplus slurry 11 accumulated into the slot 4 from the core 17 of a scouring pad 10 towards a periphery 18, a slurry 11 will be in the condition of having piled up in the slot 4 comparatively for a long time. Thus, since the time amount which piles up in the slurry 11 fang furrow 4 by changing the configuration of a slot 4 can be changed, the rates supplied to a polish front face from the inside of a slot 4 also differ. Consequently, it becomes possible to change extent of polish.

[0035] Thus, the grade of polish can be variously changed as a design changing the shape of a quirk, and by changing the depth of a slot 4.

[0036] Since it is stuck on the lower layer 1 with the double-sided tape 7, when changing polish conditions, the piece 5 of a pad tears off the piece 5 of a pad, and should just stick the new piece 5 of a pad. Since the piece 5 of a pad is divided into at least two or more pieces, compared with the case where the upper layer of the same magnitude as a lower layer 1 is exchanged, it can do exchange simply far and can be enough exchanged also by the one-person activity. Therefore, since there is little modification of polish conditions farther than the conventional thing and it ends, the time amount which suspends polish equipment 20 can be shortened. As a result, the manufacture effectiveness of a semi-conductor can be raised.

[0037] If the piece 5 of a pad of a different configuration is prepared partly, various polish conditions can be created by sticking the piece 5 of a pad again, since there is no need of sticking the whole scouring pad again at this time, modification of polish conditions is a short time, it can end, and an activity can be efficiently done in an experiment or a development site.

[0038]

[Effect of the Invention] It can change as a design variously by formation of the shape of a quirk which was not omitted from a holder during wafer polish with friction, and was stabilized in the grade of polish, and the scouring pad which can carry out exchange easily can be offered. [ of a wafer ]

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[Translation done.]

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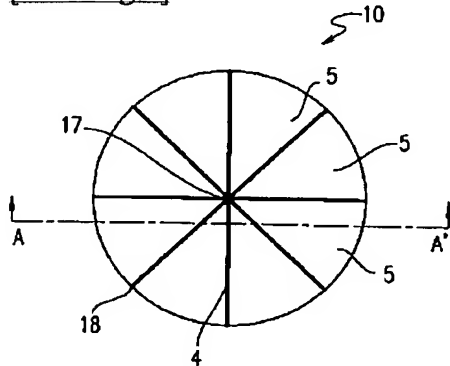
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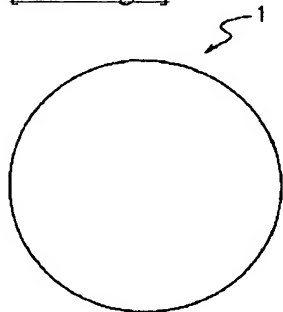
DRAWINGS

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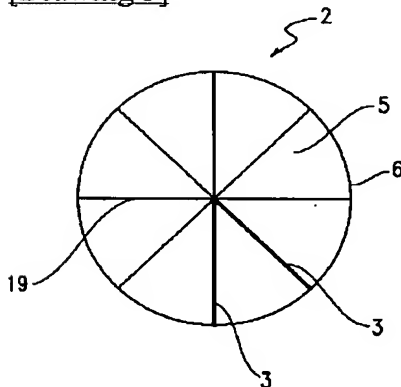
[Drawing 1]



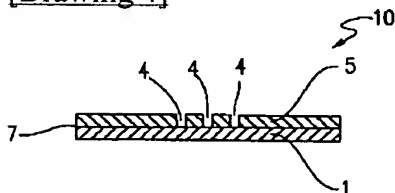
[Drawing 2]



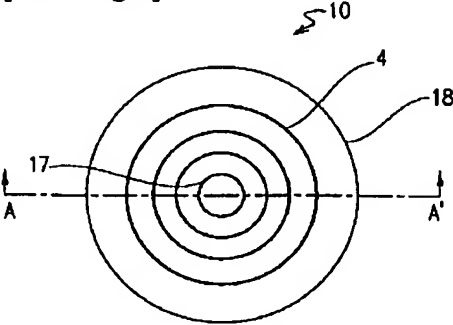
[Drawing 3]



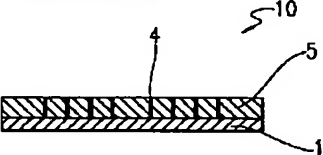
[Drawing 4]



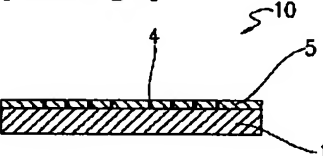
[Drawing 5]



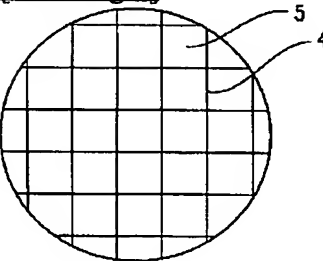
[Drawing 6]



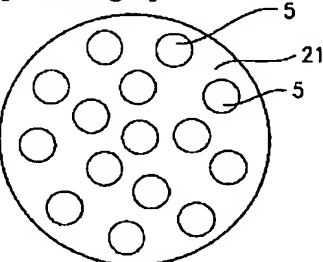
[Drawing 7]



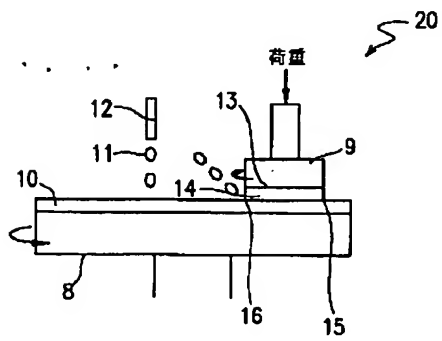
[Drawing 8]



[Drawing 9]



[Drawing 10]



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[Translation done.]